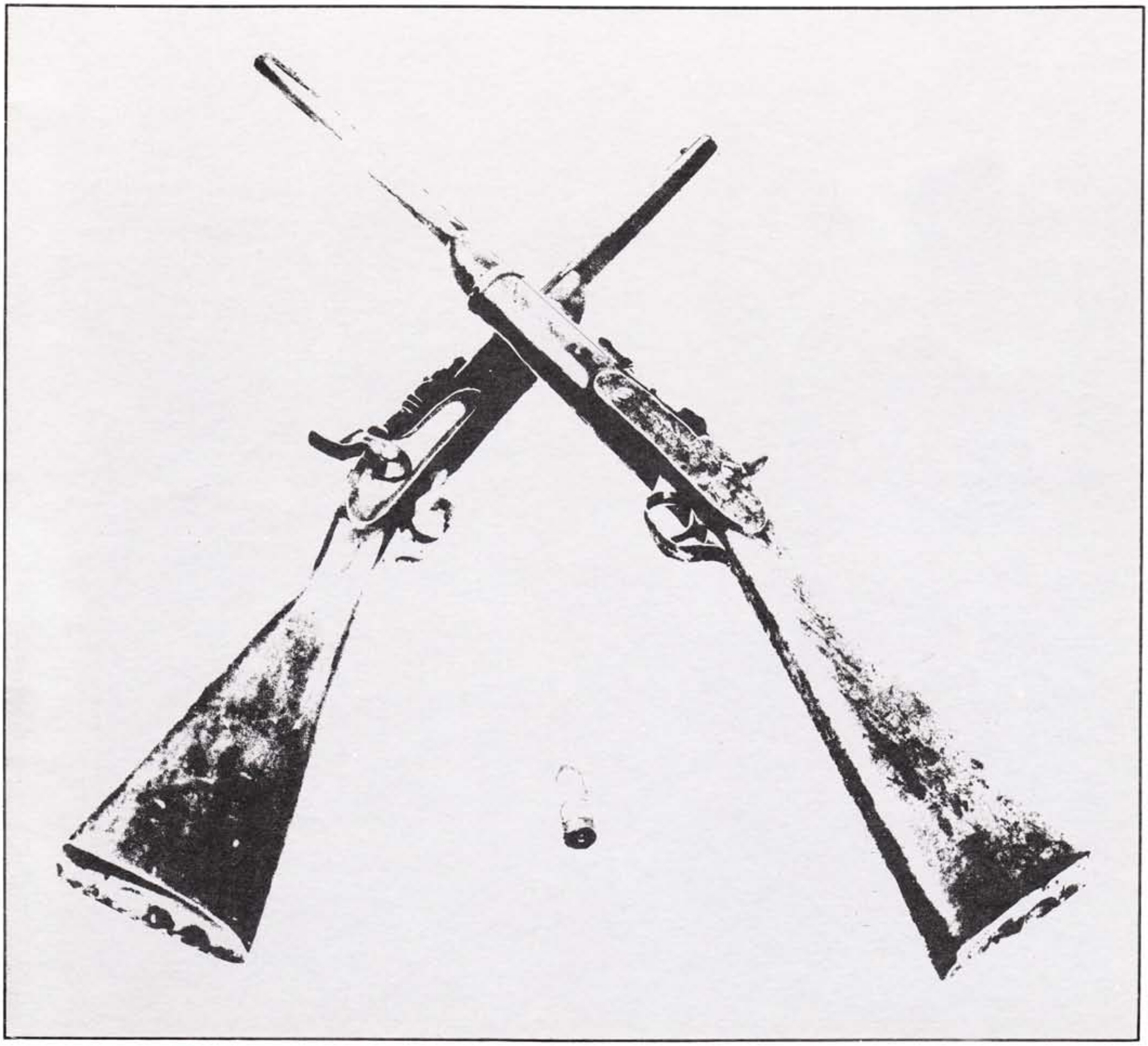
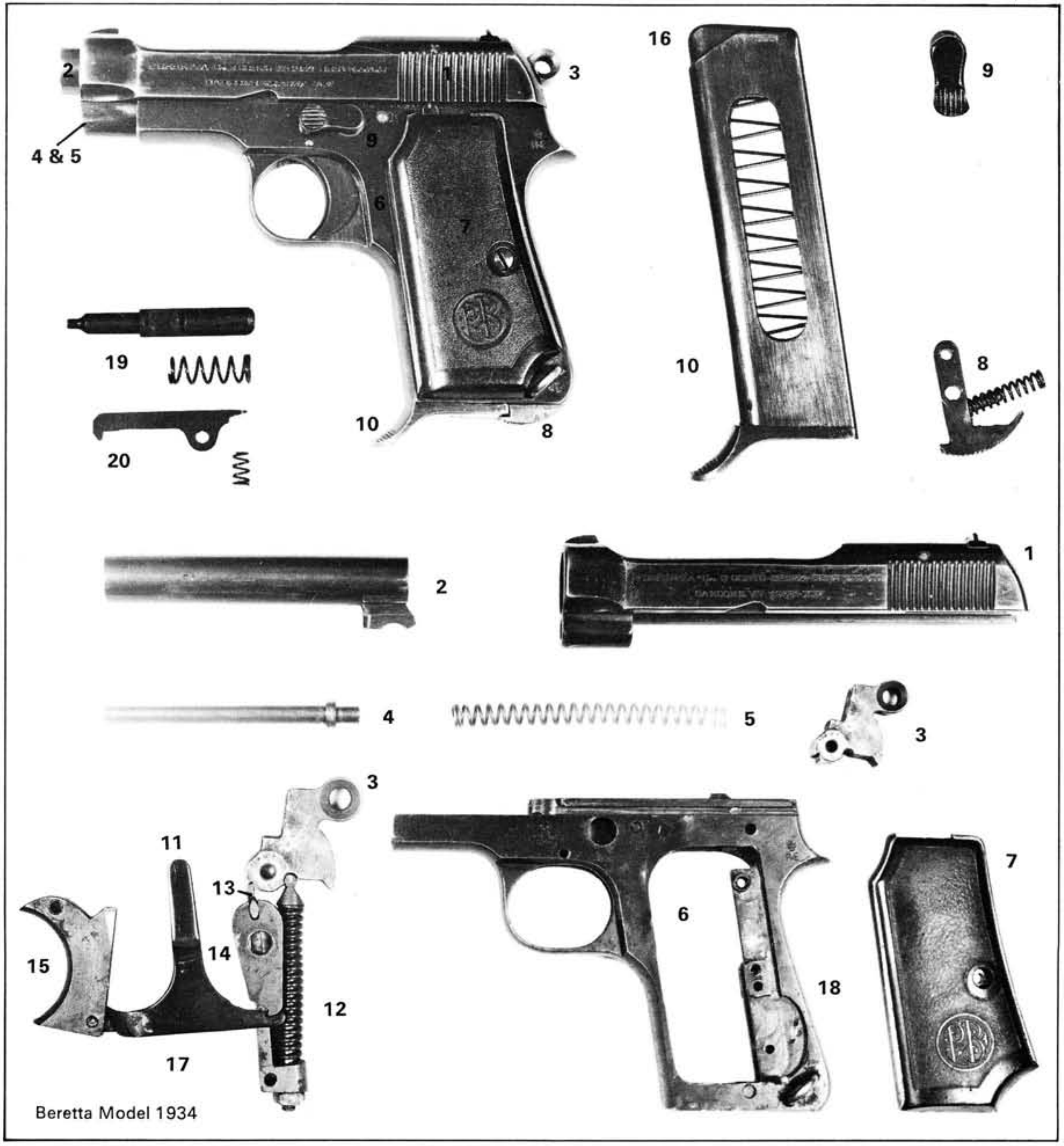
SMALL ARMS PROFILE

18

ENFIELD ARMS
THE EARLY BREECH-LOADERS



Glossary of terms



Beretta Model 1934

Automatic The common name for a self-loading or semi-automatic pistol. This has been used throughout the Profile Series to denote the above.

Backstrap (18) The part of the frame which forms the rear of the grip.

Barrel (2) The tube down which the bullet is guided.

Bent (13) Notch in hammer.

Breech Rear portion of barrel.

Chamber Part of the gun that receives the charge or cartridge.

Disconnector (11) A device to prevent multiple shots being fired on a single pull of the trigger.

Ejector A part designed to assist the removal of the empty case.

Extractor (20) Same as ejector but more often applied to automatic weapons.

Firing Pin (19) The pin that detonates the cartridge priming.

Follower (16) Part of the magazine that guides the cartridges upwards.

Frame (6) See Receiver.

Hammer (3) A device to detonate the priming of the cartridge or actuate the firing pin.

Magazine (10) A container for cartridges used to feed a gun automatically.

Magazine Catch (8) The catch that holds the magazine in place in the gun.

Mainspring (12) The spring that actuates the hammer.

Muzzle The open end of the barrel.

Receiver (6) The main housing for the major components.

Recoil Spring (5) The spring that controls the movement of the slide or other moving components upon firing.

Recoil Spring Guide (4) A guide that prevents the recoil spring from becoming damaged.

Safety Catch (9) A device to prevent the gun being fired.

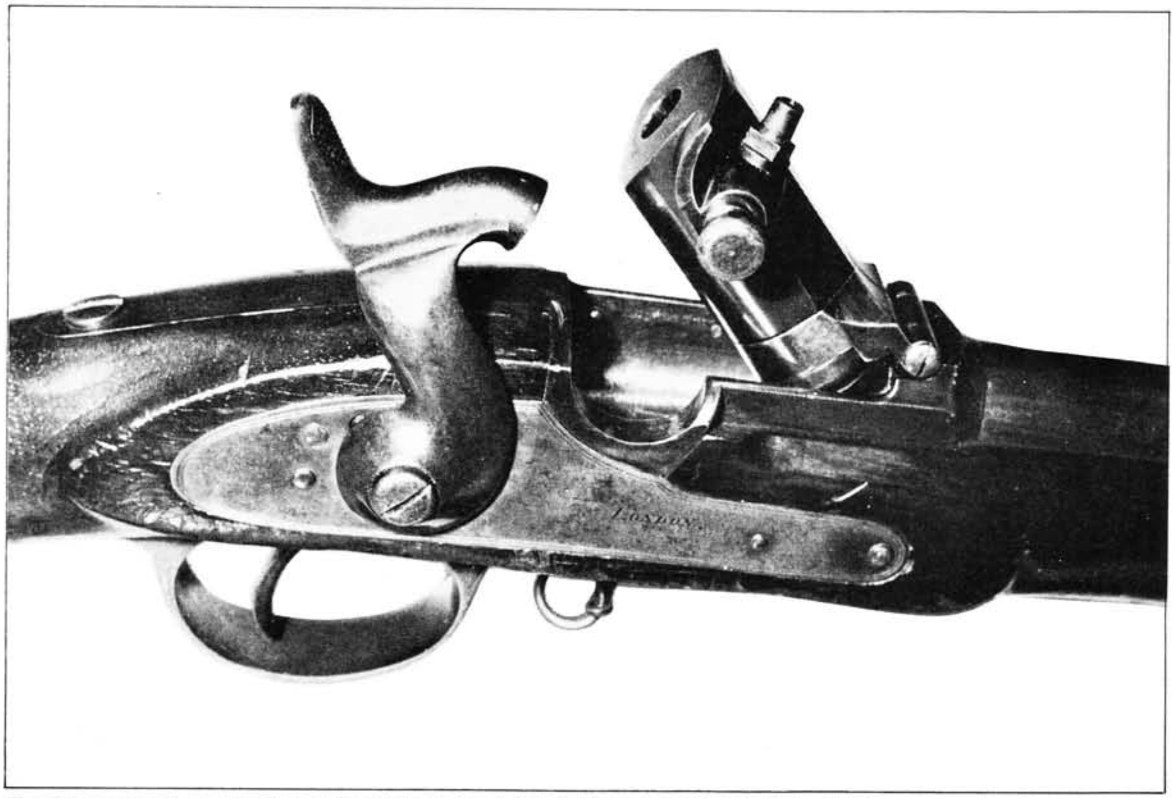
Sear (14) A lever that transmits movement from the trigger to the hammer.

Slide (1) The sliding breech block often containing the extractor and the firing pin, used to close the rear of the barrel.

Stocks (Grips) (7) Wooden or plastic pieces used as a handle.

Trigger (15) A lever which is used to release the hammer mechanism.

Trigger Bar (17) A lever connecting the trigger to the seer.



The Mont Storm Conversion of the Enfield Rifle was one of those submitted for trial. It was designed for paper-cased cartridges only (*Author*)

Enfield Arms
The Early Breech-Loaders

by E. G. B. Reynolds

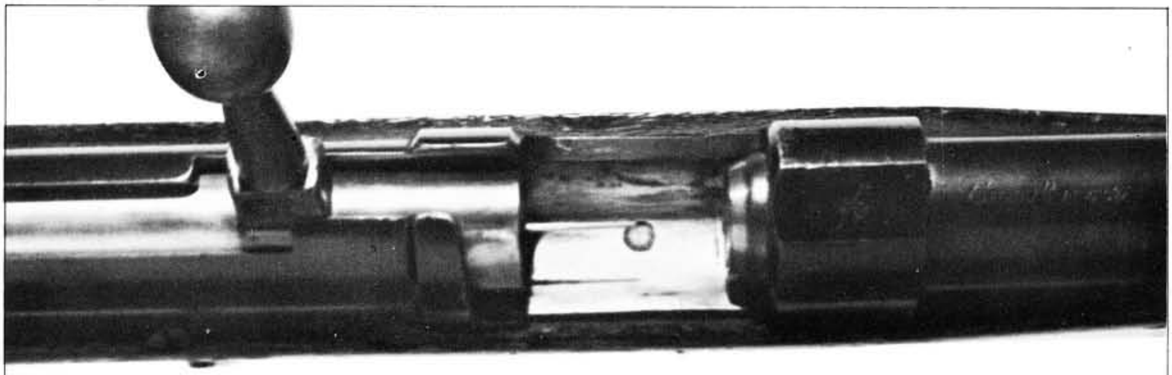
The decision to adopt a breech-loading rifle for the British armed forces was undoubtedly hastened by developments on the Continent where the Prussians had been the first to appreciate its advantages over the muzzle-loader. Like all innovations in the early history of British military arms there was opposition from high authority to such a radical change. The breech-loading principle was denounced as—to quote a freely expressed criticism—'Improper in the firearms of infantry. The soldier, being enabled to fire more rapidly, would squander away his ammunition and find himself bereft of it when most needed.' Twenty years later, similar arguments were raised against the adoption of a magazine-loading arm. Fortunately, wiser counsels eventually prevailed.

With a general appreciation of the disadvantages inherent in loading from the muzzle and the principle of the rifled barrel universally accepted, inventors and weapon designers in the mid-nineteenth century concentrated on perfecting a method of breech-loading, and in 1864 a special British War Office committee gave its unanimous opinion that it was desirable to introduce a new system without further delay.

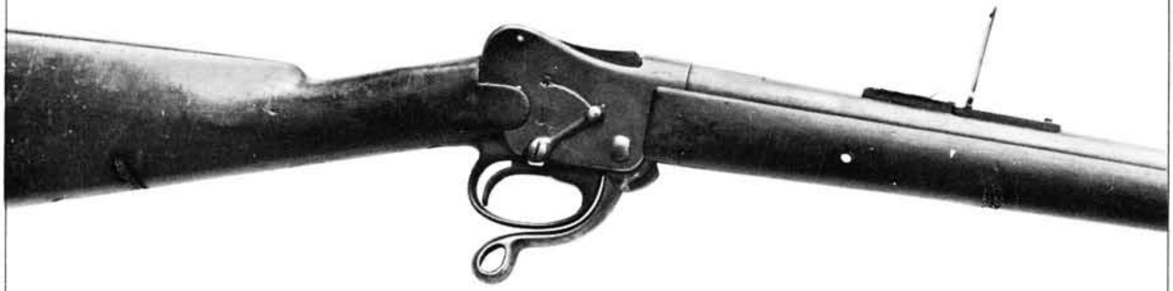
About twenty years earlier the Prussian Army had adopted a breech-loader invented by Johann von Dreyse and described as 'The great grandaddy of all bolt-action rifles.' Ignition was effected by a long needle placed in the bolt and, although the system had definite weaknesses, it proved of great advantage to the Prussians particularly in the Danish war of 1864. Rapidity of loading and firing more than compensated for its defects.

The urgent need for a British breech-loader was now apparent and, as a temporary expedience, it was decided to convert the existing considerable stocks of muzzle-loading Enfields. Gunmakers and manufacturers were therefore invited to submit proposals to this effect. Meanwhile, between 1857 and 1861, a number of experimental carbines, some made at Enfield, were in use in the cavalry and artillery.

About fifty different breech-loading systems were submitted for investigation and a number of those which appeared to be the most promising were



The action of the Dreyse Needle Gun showing the slim needle-like firing pin (*Author*)



Early Westley-Richards Carbine with safety catch forward in the firing position. The leaf on the back sight can be folded down on to the barrel towards either the breech or the muzzle (*Author*)

subjected to trials at Woolwich Arsenal and Enfield. Most, however, were immediately rejected, largely on the grounds that they necessitated considerable alterations to the rifle woodwork. Eventually a system submitted by an American, Mr Jacob Snider, was accepted and finally adopted in 1867. This action embodied a breech-block hinged on the right side of the rear of the barrel. When opened it gave access to the chamber and when closed was held by a spring catch stud. A striker passed diagnonally through the block, its forward end held clear of the cap by a spring. A claw extractor was attached to the breech-block which, after withdrawal a short distance, allowed the case to be thrown clear by turning the rifle over. Little difficulty was experienced in fitting the action to the Enfield rifle.

With its original paper-cased cartridge, accuracy was inferior to that of the muzzle-loading arm. This was remedied by a new cartridge designed by Colonel Boxer, RA, then the Superintendent of the Royal Laboratory at Woolwich Arsenal, by whom many experiments were carried out. The case of the improved cartridge was constructed of thin sheet brass wrapped round to a double thickness and fixed to an iron base. This greatly strengthened the round and effectively checked escape of gas.

With this cartridge the converted rifle—known as the Snider-Enfield—was more accurate than in its muzzle-loading days and it could be loaded and fired from 12 to 18 times per minute. With this combination the English army was the first to be equipped with a breech-loading rifle using a metal cartridge case. It is recorded that Snider rifles were still found to be serviceable after firing from 50,000 to 70,000 rounds.

When the conversion programme was completed, a number of new Snider-Enfields were made and these were the first rifles to be made at Enfield with steel barrels instead of barrels made of wrought iron. Carbines were also converted and new ones made at

Enfield for the Cavalry, Royal Artillery and other military and Colonial Police units. The barrels in the new Sniders mostly embodied three or five groove rifling.

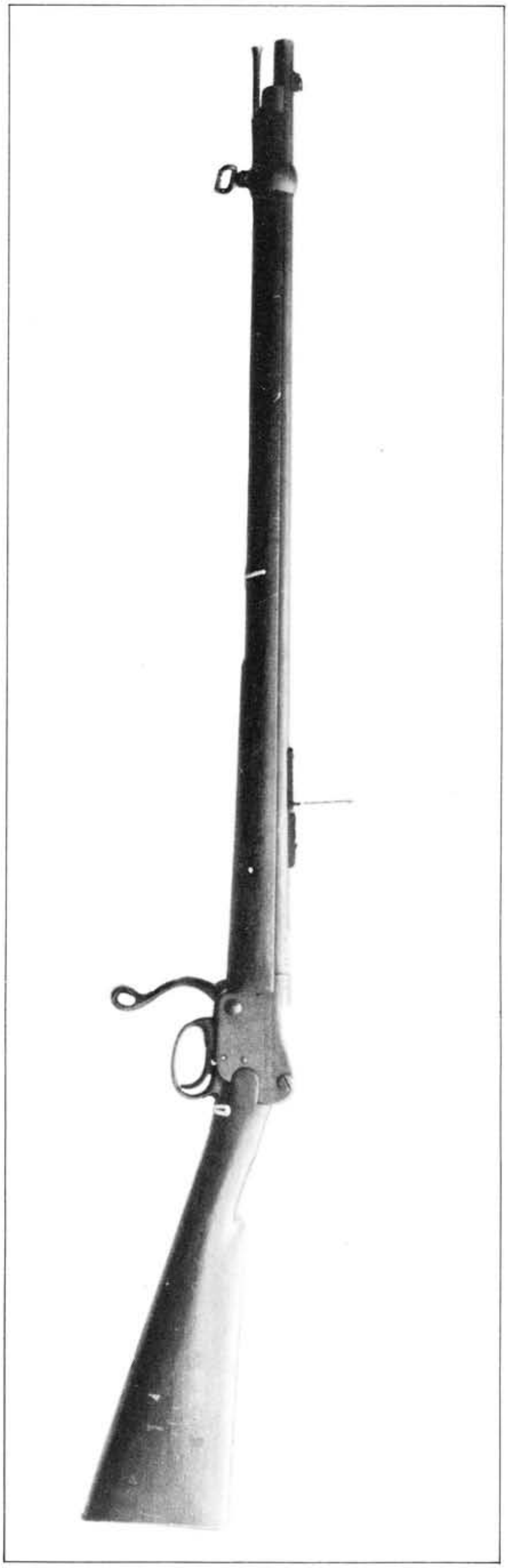
Though fulfilling the purpose for which it was intended, and putting the army ahead of most other Continental powers, the Snider was merely a stop-gap arrangement, and in 1866 a new War Office Committee was appointed to consider the adoption of an entirely new breech-loading rifle. It had become evident that one giving greater accuracy and ranging power was a definite requirement. The Snider, ·577" in calibre and in the class commonly known in target shooting circles as 'big bores', was reasonably accurate up to 600 yards. It was not considered accurate enough for the long distance events at Wimbledon and it was undoubtedly a sore point that the British Service Rifle could not compete with any success in this sphere against the 'small-bore' muzzle-loaders such as the Whitworth. Consideration was therefore directed towards a breech-loading arm with a reduced bore and greater accuracy and range.

In response to the Committee's invitation, about 120 weapons and 50 types of ammunition were submitted, many of which were quite unsuitable and immediately discarded. It was particularly noticeable that less attention had been paid by the inventors to accuracy than to ingenious methods of closing the breech. Careful examination and trials of certain selected arms took place but none were considered of sufficient merit to be adopted. There was much deliberation with the leading gunmakers and those considered to be experts on military arms and there appears to have been considerable dissention between the War Office Committee and outside sources. Eventually it was decided to separate the question of the breech mechanism from that of the barrel.

It was decided to limit the barrels to those systems of rifling which had given the best results in muzzle-loading arms and these included the barrels of Henry, Lancaster, Rigby, Westley-Richards, Whitworth and the Small Arms Factory at Enfield. For the barrel competition it was decided to use the same type of breech-mechanism for all and the Henry action, which had shown itself superior to all others in a previous competition, was selected for the purpose. Limits were laid down as to length, weight and calibre of barrel, and for the cartridge.

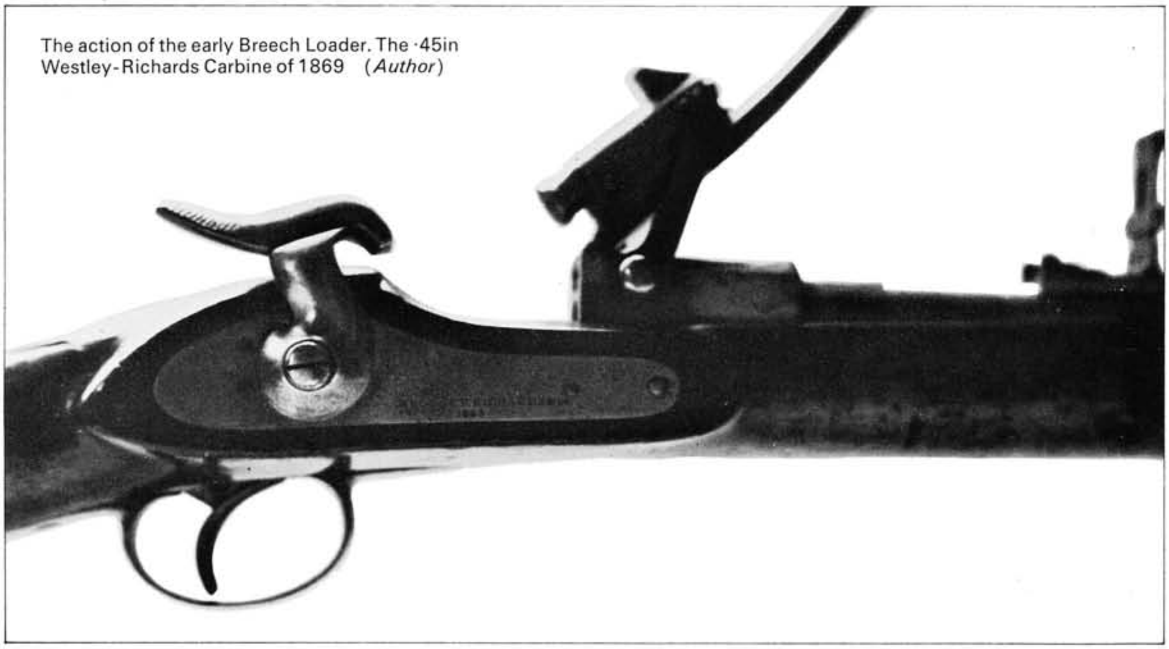
Even though the end product was not entirely a success, the deliberations appear to have been thorough, and it is on record that 45 additional arms were submitted while the enquiry was in progress.

In February 1869, the Committee reported that they had finally selected a breech-mechanism submitted by M. Frederich von Martini of Switzerland and the barrel of Mr Henry of Edinburgh ; the two to be incorporated by the staff of the Enfield factory into what was hoped would be 'a model long-range arm

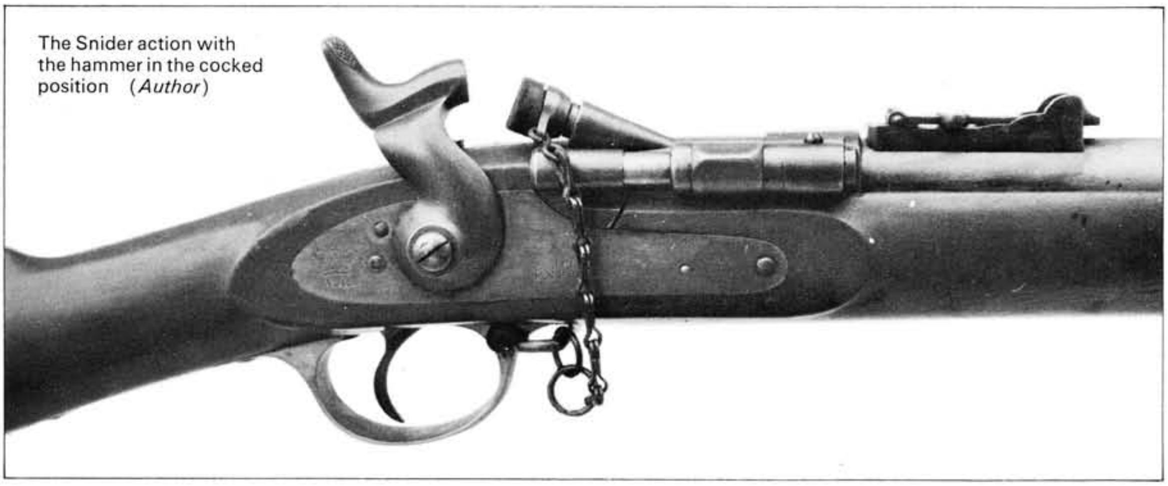


An example of early Westley-Richards Breech Loading Carbine. Carbines made by this firm were introduced experimentally into the British Army between 1857 and 1861 together with Greeners, Sharps and Terry's Carbines (*Author*)

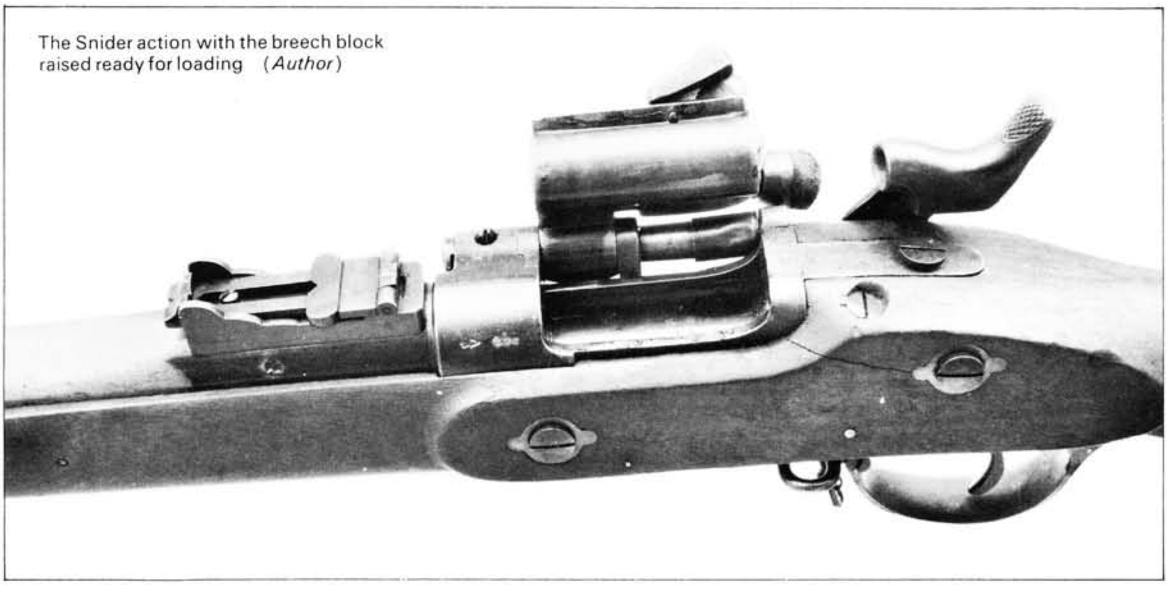
The action of the early Breech Loader. The ·45in Westley-Richards Carbine of 1869 (*Author*)

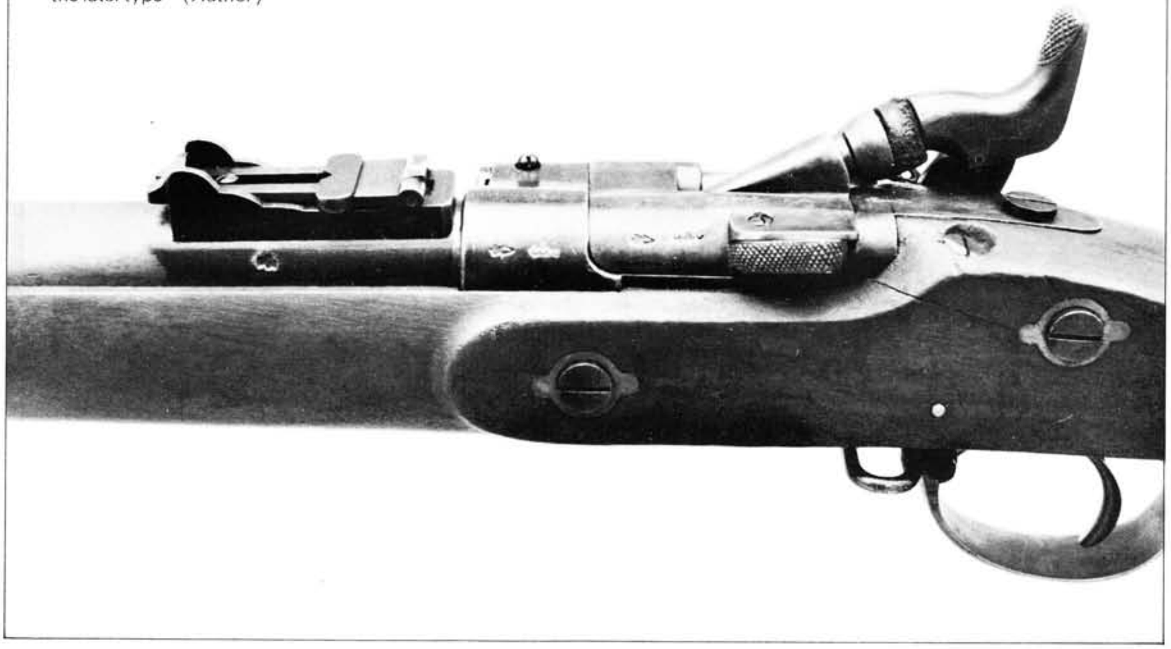


The Snider action with the hammer in the cocked position (*Author*)

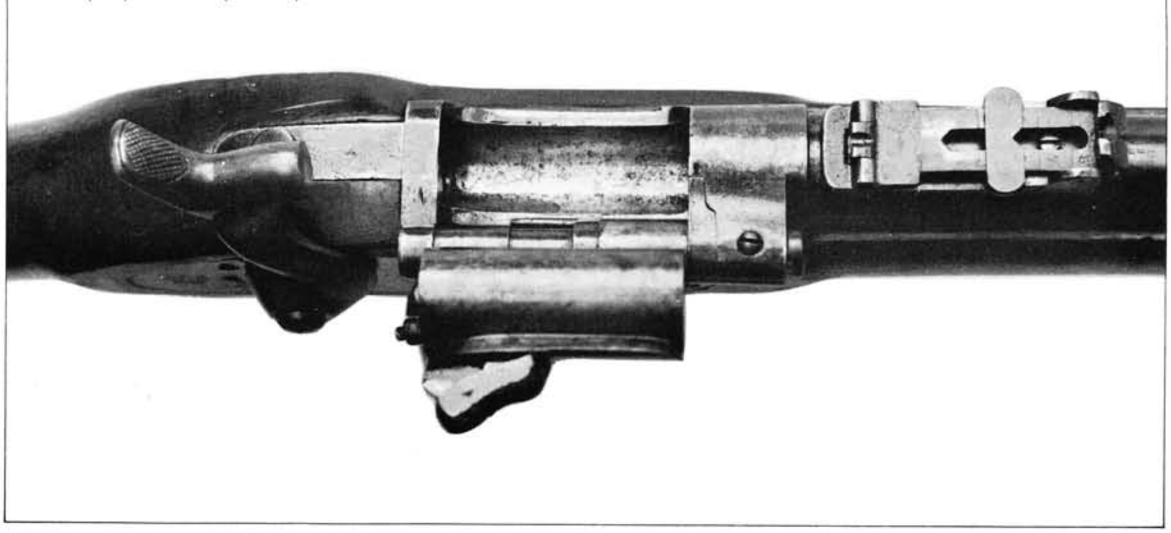


The Snider action with the breech block raised ready for loading (*Author*)





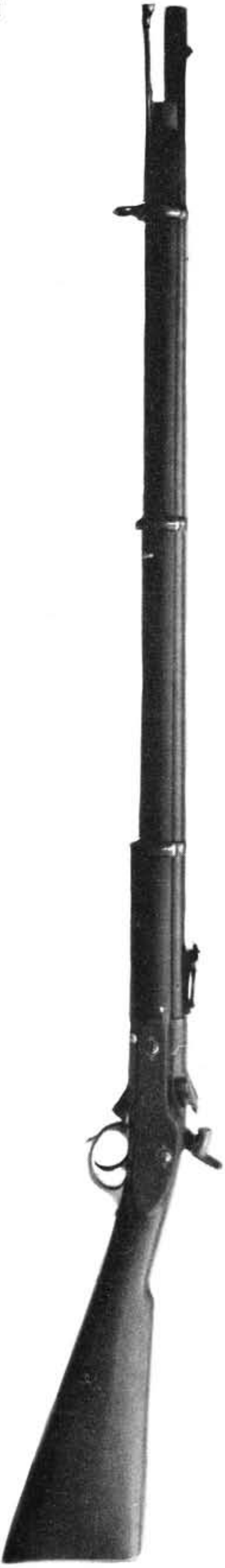
The Snider action with the breech closed. This is the later type (*Author*)



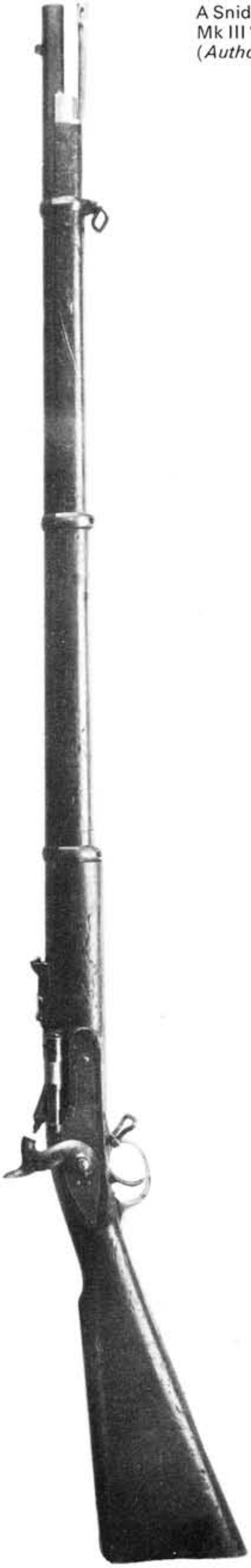
The open chamber of the Snider made by the London Arms Company in 1863 (*Author*)

of precision.' The action was a development of the American Peabody system. In this the breech end of the barrel is closed by a block whose rear end works on a horizontal pin, having its axis at right angles to the axis of the bore of the barrel; the breech-block, containing the firing mechanism, being operated by an under-lever. The new rifle, called the Martini-Henry, received a good deal of adverse criticism but, compared to its immediate predecessor, it showed marked superiority in accuracy, and a considerable reduction in calibre—·577" to ·45"—had been achieved. One very important factor appears to have been completely overlooked—the inability to clean this new small-bore rifle from the breech end, thus shortening its potential accuracy life.

The cartridge selected for the new rifle was made up in Boxer coiled-brass cases with the form of bullet which had been successfully used by Mr Henry. It had a paper covered solid cylindrical bullet of 480 grains with a small cavity in the base, and had a wad of pure hard beeswax between jute discs placed over 85 grains of blackpowder. This cartridge, however, was found to be inconveniently long. It was improved by being made shorter and 'bottle-necked' in shape, the rifle chamber being correspondingly enlarged. This allowed for an improvement in the action by shortening the



A Snider-Enfield
Rifle of 1863
(*Author*)



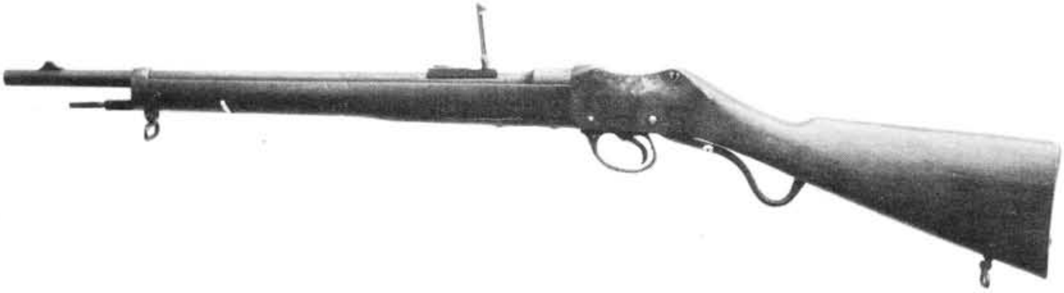
A Snider Rifle pattern
Mk III* ·577 calibre
(*Author*)

breech-block. In February 1871 the rifle and cartridge were recommended for the British armed forces and officially adopted the following April. They met, as a prominent writer of the day described, 'a storm of disapprobation, in some respects unreasonable, and with an equally reasonable amount of support from their partisans'.

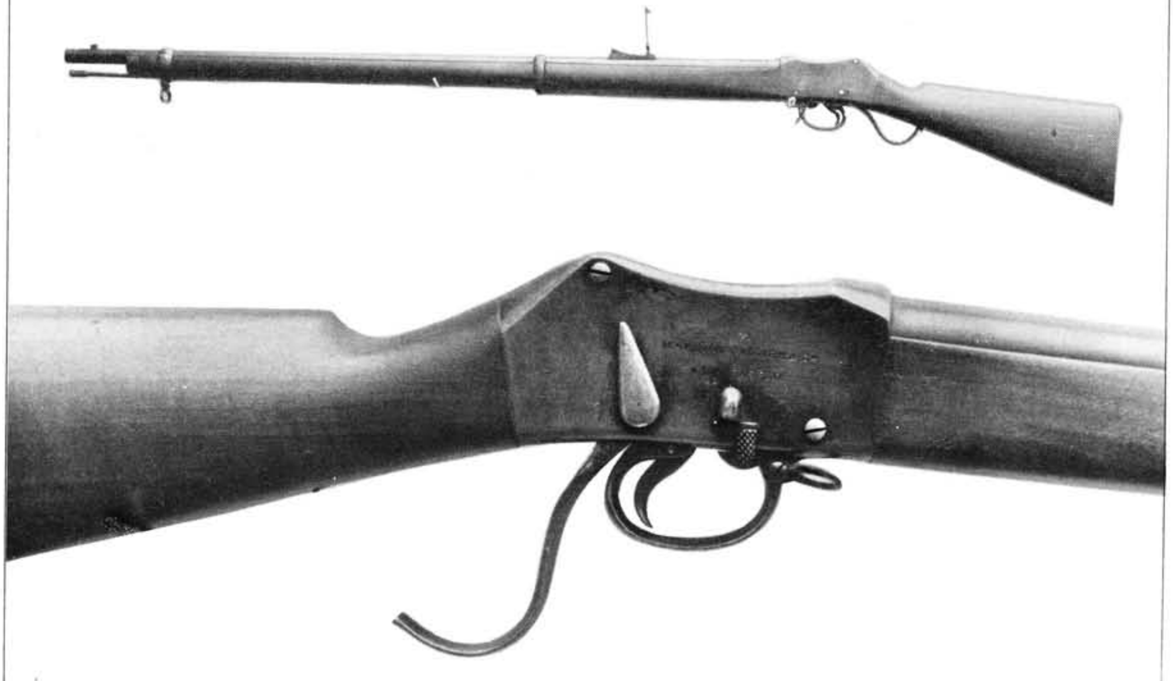
Later that year, the Queen's Prize at Wimbledon was for the first time competed for entirely with breech-loaders; the Snider replacing the Enfield and the Martini-Henry superseding the Whitworth at long-range. Unfortunately, the Martini-Henry's long range accuracy failed to come up to expectations, due largely to the accumulation and hardening of the fouling in the deeply cut rifling grooves, and in 1883 the 1000 yards shoot was taken out of the Queen's Prize and 900 yards substituted in its place. It is on record that the previous year half the shots completely missed the target at 1000 yards. A leading critic of the day had this to say :—

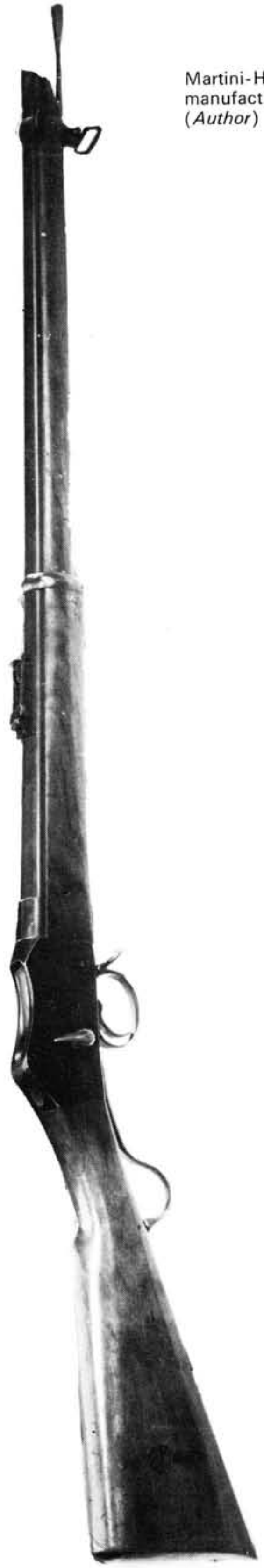
'That a weapon costing so much to the nation, and specially designed and introduced as a

·303 Martini-Enfield Carbine (*Author*)

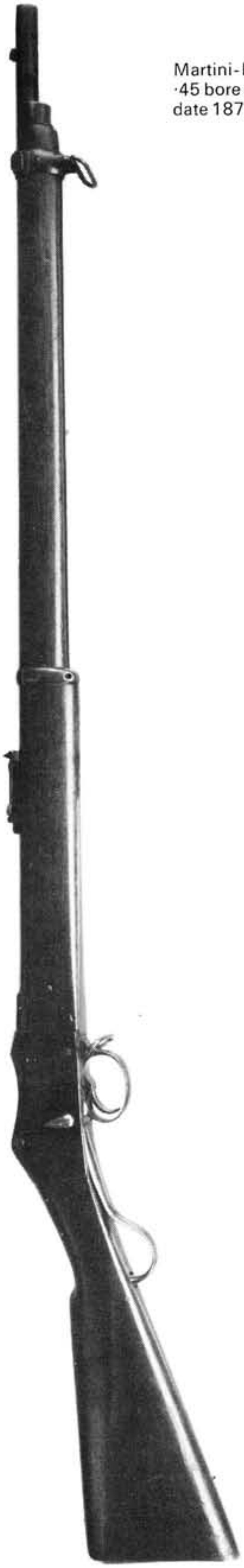


·450in Martini-Henry Rifle made by Martini Tanner & Company, Fraufeld, Switzerland (*Author*)

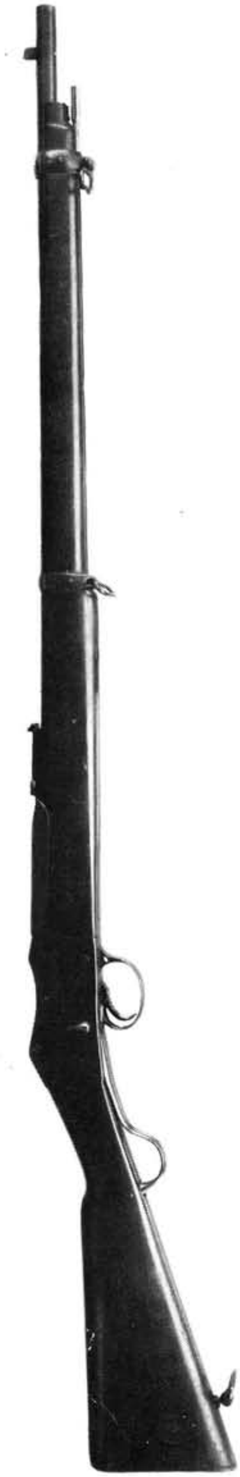




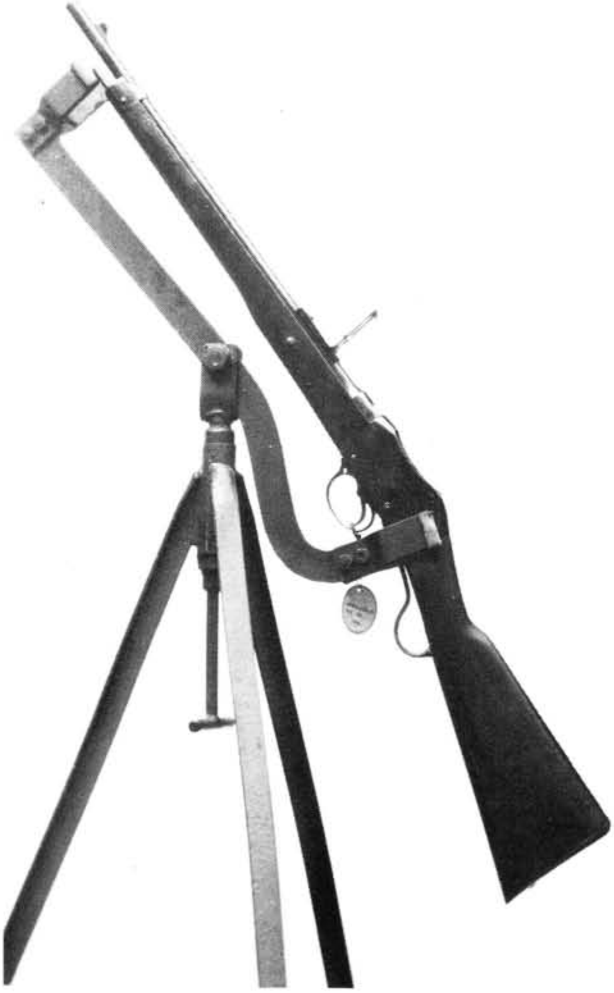
Martini-Henry Mk I manufactured at Enfield (*Author*)



Martini-Henry Mk II with a ·45 bore and 7-groove rifling, date 1876 (*Author*)



Martini-Enfield Rifle (*Author*)



Sealed Pattern of Martini-Enfield Carbine on an Army Aiming Rest. Notice the attached seal (*Author*)

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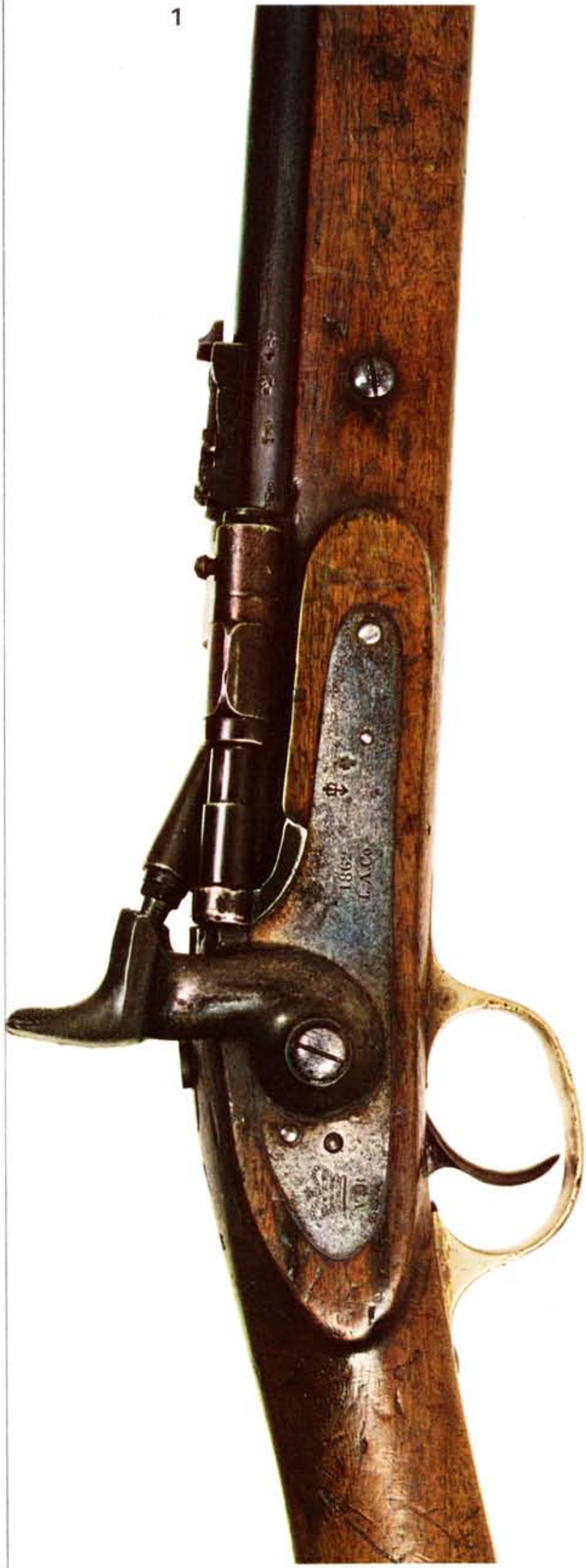

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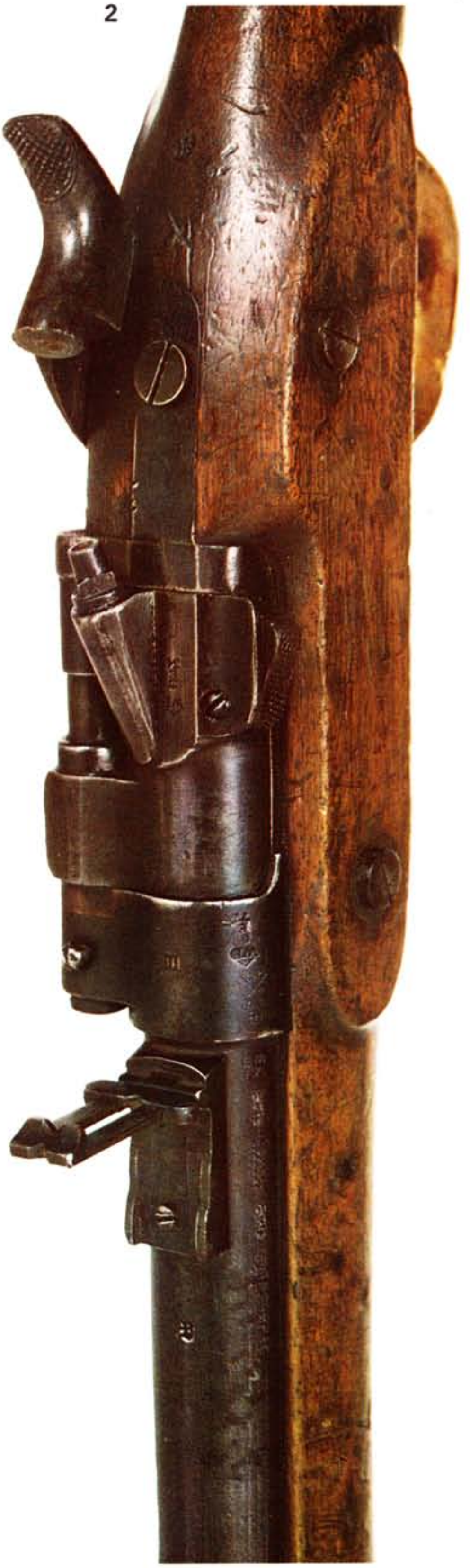

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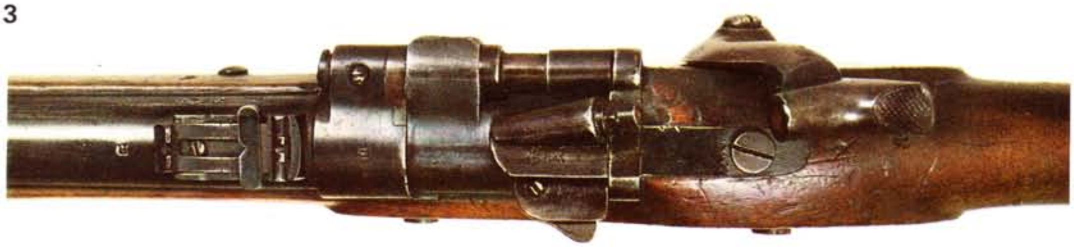

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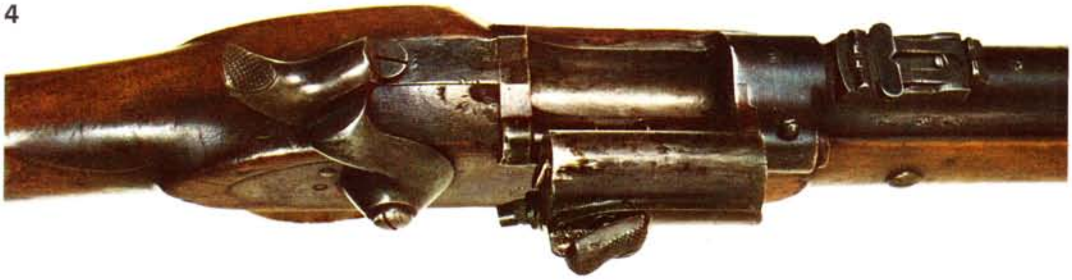

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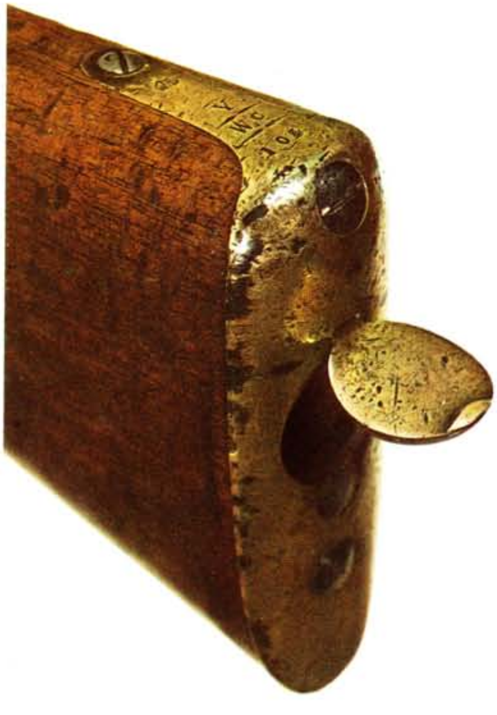


Photographs of a Mk III Cavalry Carbine

1 The lock plate indicates that the weapon was manufactured by the London Arms Company in 1862. (*L.A. Co*)

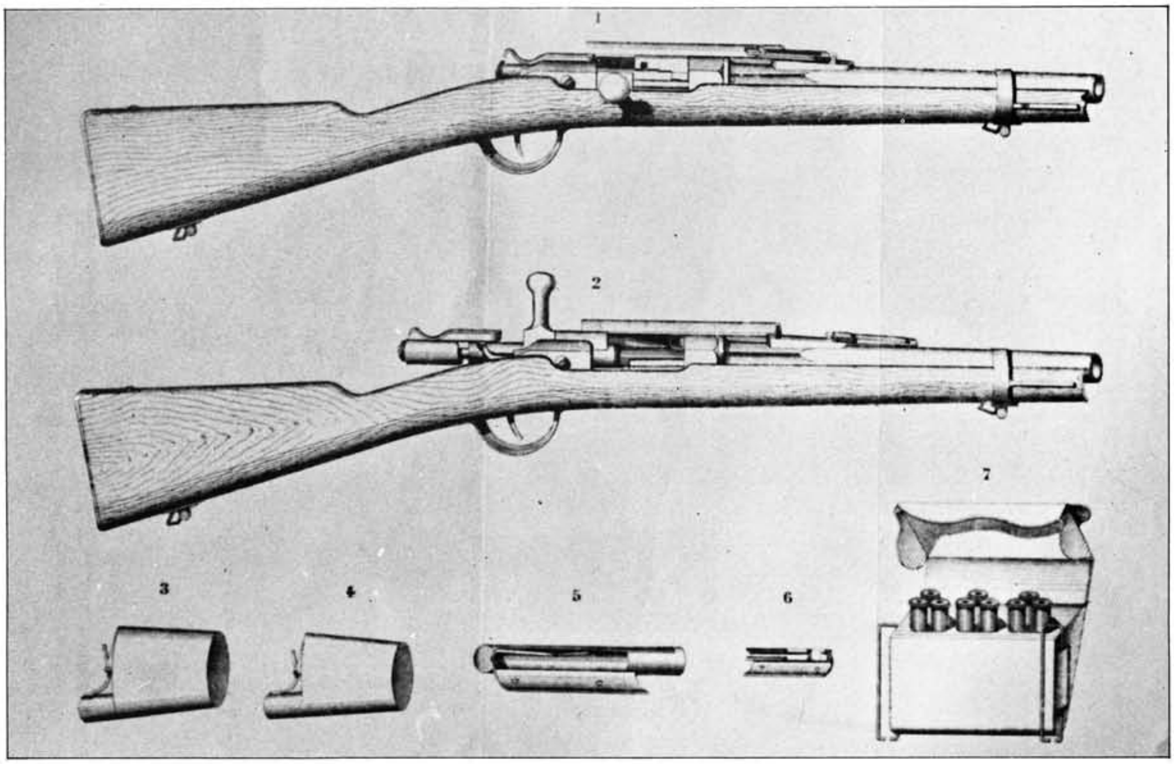
2 The Mk III featured a positive lock on the breech. Notice the raised rear sight. The barrel is steel.

3 Top view of the Snider Breech

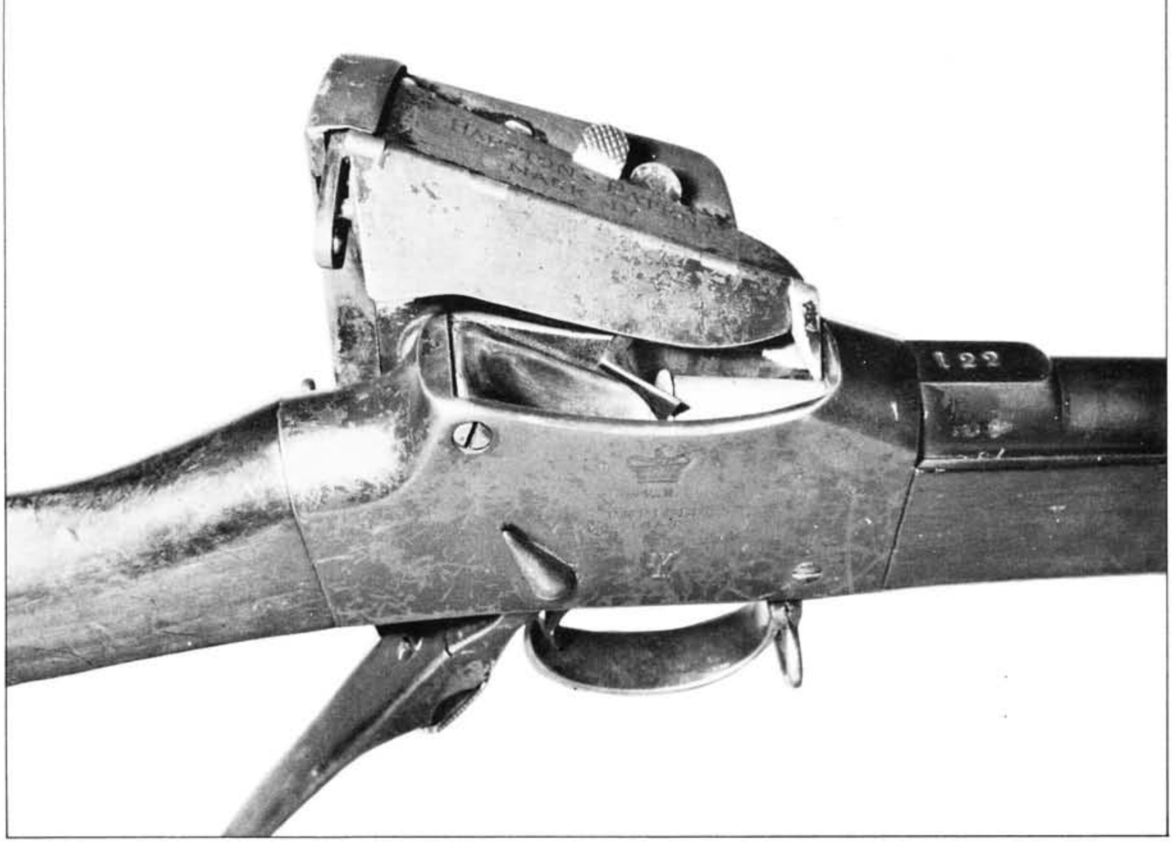
4 The breech open ready for loading

5 Butt trap on the Cavalry Carbine. Notice the original owners markings

Editors Collection © Profile Publications Limited



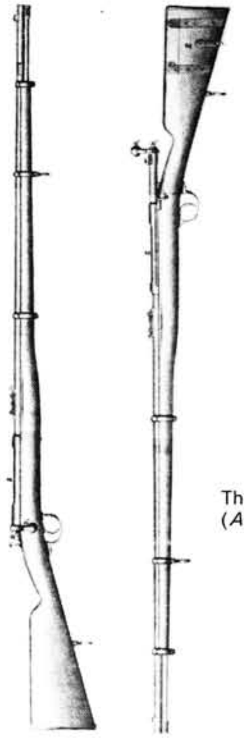
The Harston Quick-Loader was another invention designed to increase the rate of fire of the Martini-Henry which did not find favour (*Author*)



long-range arm, should be the discreditable means of causing the conditions of so important a rifle competition to be altered and debased after existing for more than twenty years, is a fine commentary on the system by which such an arm was selected, manufactured, and foisted on the public.'

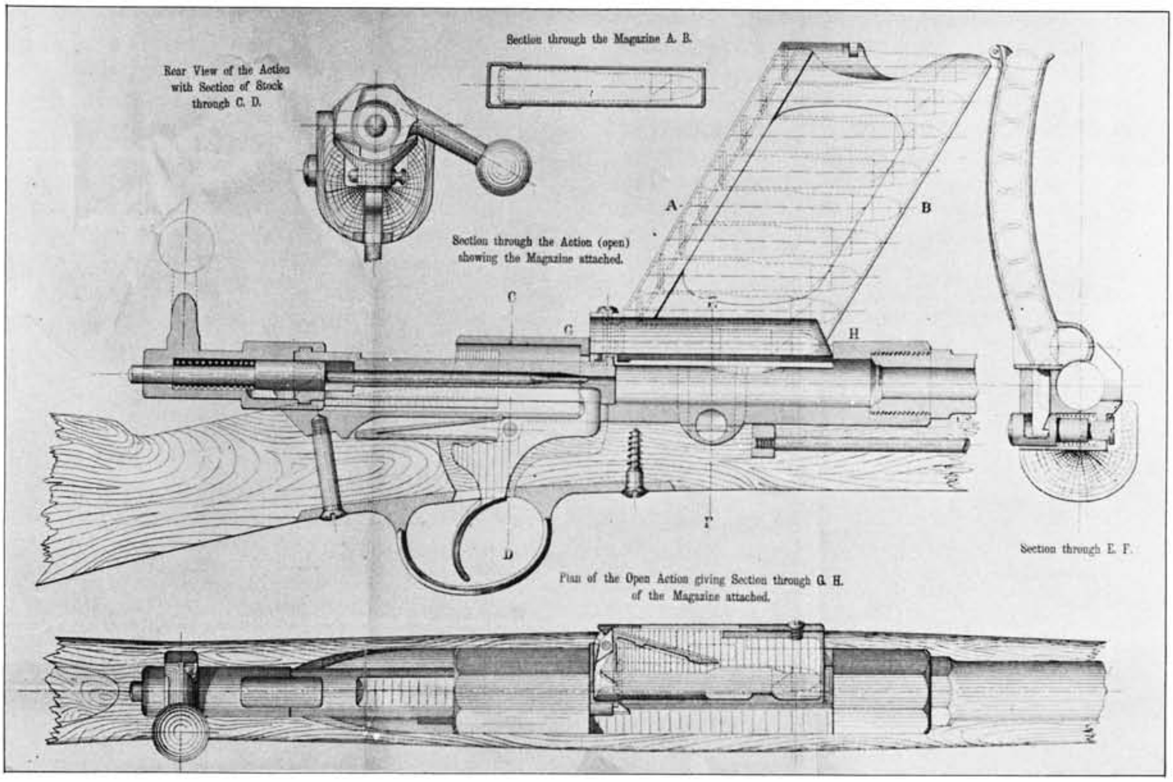
In 1886, the Small Arms Committee having studied at some length the possibility of improving the Martini-Henry, recommended a reduction of the bore to ·402", using a solid drawn cartridge case loaded with 85 grains of powder, and a bullet of 380 grains. This gave a muzzle velocity of 1570 f.s. and was far superior to the Service arm and cartridge in flatness of trajectory and range. Eventually 70,000 rifles of this smaller calibre were made at Enfield. The first sealed patterns to guide manufacture embodied a form of ratchet rifling. In this, the grooves instead of being symmetrical, were deeper at one side than the other. Before production commenced, the rifling was changed and the barrels which were eventually fitted had seven shallow grooves without sharp angles and were similar to those developed by Mr Metford a few years earlier. The new rifle was known as the Enfield-Martini but, due to pending changes consequent on successful smaller calibre development, it was never officially introduced into the British Service. The Enfield records show that these rifles were converted into a Mark IV pattern of the Martini-Henry. Meanwhile, a great deal of experimental work had been carried out with barrels

◀ The Alexandre Quick-Loader, an invention for converting the Gras Rifle into a Magazine Weapon. It was adapted to fit the Martini-Henry and was tested at Enfield in 1885. It consisted of a tube to hold two cartridges and was fixed to the left side of the rifle above the action. In the trials no gain in rapidity of fire was observed and it was consequently rejected (*Author*)



The Schulhof Magazine Rifle (*Author*)

One of the Mannlicher Rifles with a detachable magazine which was included in the trial of 1882-1885. It was an early rejection (*Author*)


Section through the Magazine A. B.
Rear View of the Action with Section of Stock through C. D.
A
B
Section through the Action (open) showing the Magazine attached.
C
G
H
F
D
Section through E. F.
Plan of the Open Action giving Section through G. H. of the Magazine attached.

of smaller bore and shallower rifling. Considerable success had attended Mr Metford's system when used with a hardened bullet. Besides greater accuracy, fouling was considerably diminished by the shallower grooved rifling.

Despite its shortcomings, the Martini-Henry continued to be the British Service rifle for another two years when it was superseded by the ·303" Magazine Rifle. Converted to smaller calibres —·303" and ·22"—Martini-Henry's remained with the armed forces for many years. When fitted with Metford barrels they became Martini-Metfords. Later, when fitted with Enfield barrels, they became Martini-Enfields. Though at times the subject of much adverse criticism, particularly in target shooting circles, the Martini-Henry played an important role in the history of British military weapons.

The End of the Single-loader

During the last quarter of the nineteenth century rifle designers were giving much attention to speed in loading, longer ranging power and smaller calibres. Ballistic developments, especially in the field of smokeless propellants, had widened the scope for future progress and the Great Powers were taking an increasing interest in rifles carrying a reserve of cartridges which could be quickly fed into the rifle chamber, and some countries already had them in use. The desirability and efficiency of magazine arms was actually under the consideration of a War Office Small Arms Committee in 1879 and the first rifles embodying this system and or quick loading devices, were submitted to the Committee for trials. They included the Kropatschek (already in the French Marine), the Vetterli (in use in the Swiss Army), the Hotchkiss, Model 1876 Winchester, Gardner, Green and Lee rifles and the Lee carbine. The Krnka and other quick-loaders and the Mayhew cartridge holder were tried out in an effort to increase the rate of fire of the Martini-Henry. Two Mauser rifles with removable magazines similar to the Lee rifle were also obtained from the German Government.

None of the submitted arms found favour, the most promising being the Lee rifle, the Green rifle and the Mauser with Lee magazine. The Committee were apparently still a little dubious about the new system as they expressed the opinion that magazine arms should only be used under special circumstances and by the most highly disciplined men. This seemed to reflect the usual prejudice against innovations. They did however consider that continued experiments were very desirable and might lead to advantageous results for both Naval and Military Services.

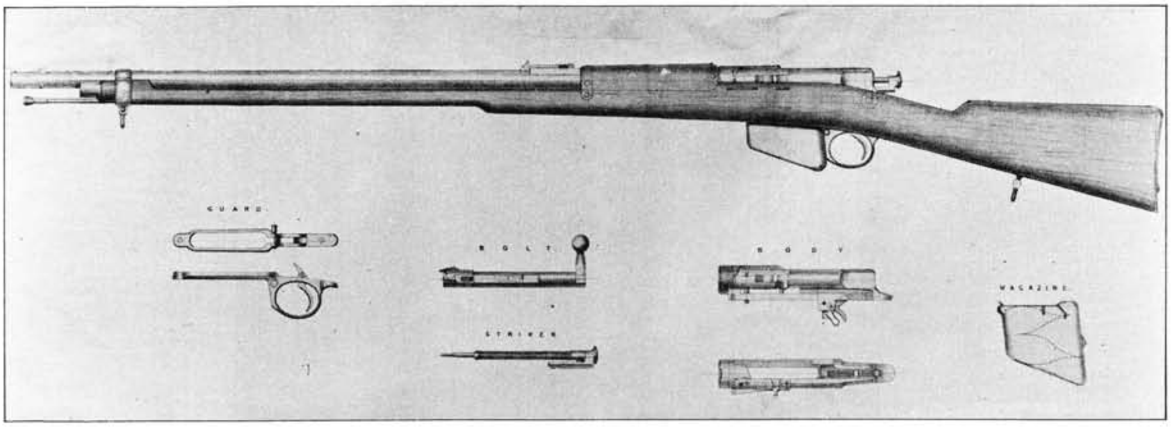
The Admiralty appears to have shown greater enthusiasm for a magazine arm than the Army and in 1882 a War Office Committee which included the Superintendent of the Royal Small Arms Factory, Col H. T. Arbuthnot, RA, and Lt Col H. St. J. Halford, one of the most prominent Match Rifle marksmen and a close associate of Mr William Ellis Metford in most of his experimental work, decided to take immediate steps to provide the Navy with a suitable arm. They also decided to try out the best of the magazine arms which had been submitted, in competition with any rifles which Sir Henry Halford obtained in America. If possible, the desired new arm should be adapted to fire the machine-gun cartridge. Questionnaires were sent to various officers of the armed forces to get their opinions on what they considered were the essential qualifications etc for a magazine rifle.

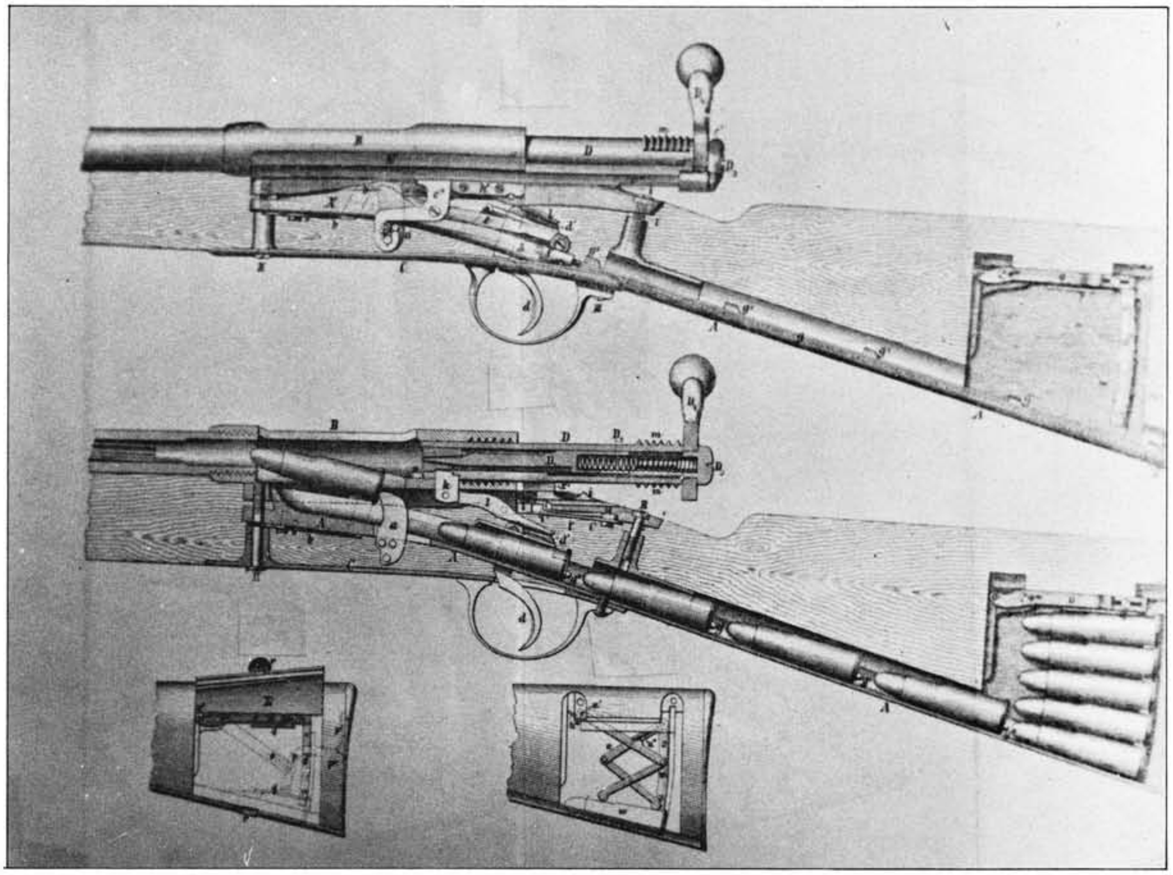
Examination and trials continued with a large number of magazine and repeating arms, including American and Continental designs, and the following year a definite conclusion was reached. There was a general concurrence of opinion on the following points:

1 That a magazine arm, when used as a single loader should not be inferior in any respect to the present Service Martini-Henry rifle.
2 That the magazine should contain at least five rounds.
3 That the weight of the arm should not be excessive.
4 That the mechanism should not be very complicated.

The following arms were now submitted to the Committee for further trials and examination: The Bethel-Burton, Blakeney, Chaffee-Rece, Deely-Edge, Evans, Fosbery, Gardner, Goodwin,

The improved Lee Magazine Rifle which was successful in the Magazine Rifle Trials and eventually became the Lee Metford after numerous modifications (*Author*)





Five Schulhof Magazine Rifles were included in the 1882-1885 trials. Three of these had magazines in the cavity in the left side of the butt. This cavity was closed by a hinged door and the rounds were fed into the chamber via a feeding tube
They all failed at the trials (*Author*)

Grant, Hotchkiss, Jarmann (3), Lee, Lorentzen, Mannlicher (5), Schulhof (5) Mauser, Needham, Nemetz, Owen-Jones, Paulson, Remington-Lee, Skerray, Spencer-Lee, Spitalski, Whitney Arms and Winchester magazine rifles and the Ballard repeating carbine.
In the trials which took place only three did not break down in any of the tests; they were:

1 The Lee magazine rifle, as improved at the Enfield Royal Small Arms Factory.
2 The improved Lee rifle, with Bethel-Burton magazine modified at Enfield.
3 The Owen-Jones magazine rifle, manufactured at Enfield.

These three were given further trials, from the first of which the Owen-Jones emerged successful, and was considered superior to any other arm. But for the fact that it was expensive and not easy to manufacture it might well have been selected. The Lee was then further improved and the Owen-Jones was discarded. It was not until 1887 that the final trials took place with the Lee magazine rifle and the Lee with Bethel-Burton magazine. Both were now fitted with ·402" barrels embodying the Metford type of rifling; in the earlier trials they had been fitted with Martini-Henry barrels of ·45" calibre.
The Lee magazine rifle was a development of one produced in 1879 by an American, James P. Lee of Ilion, New York. It had a box magazine with capacity for five cartridges which lay horizontally against the upward thrust of a spring in the bottom of the magazine. The principle was much the same as in all later British Service magazine rifles. The extracting mechanism of the bolt action, which gave earlier troubles, had been improved at Enfield.
The bolt mechanism of the Lee rifle with Bethel-Burton magazine was the same as that in the improved Lee. The magazine was a hopper placed on the right of the action and also held five cartridges. When not in use it lay alongside the action, the top projecting about an inch above it. In this position cartridges could not be fed into the rifle chamber. In use, the magazine was pushed inwards until the top projected about two inches above the body of the rifle and in this position the cartridges could be fed onto an elevator. In action, the elevator raised the cartridges in front of the bolt face and they were fed into the chamber by the forward movement of the bolt.
The trials greatly favoured the Lee magazine rifle but still no decision could be made as the question of a yet smaller calibre rifle had been re-opened following successful developments in this direction on the Continent. Eventually it was

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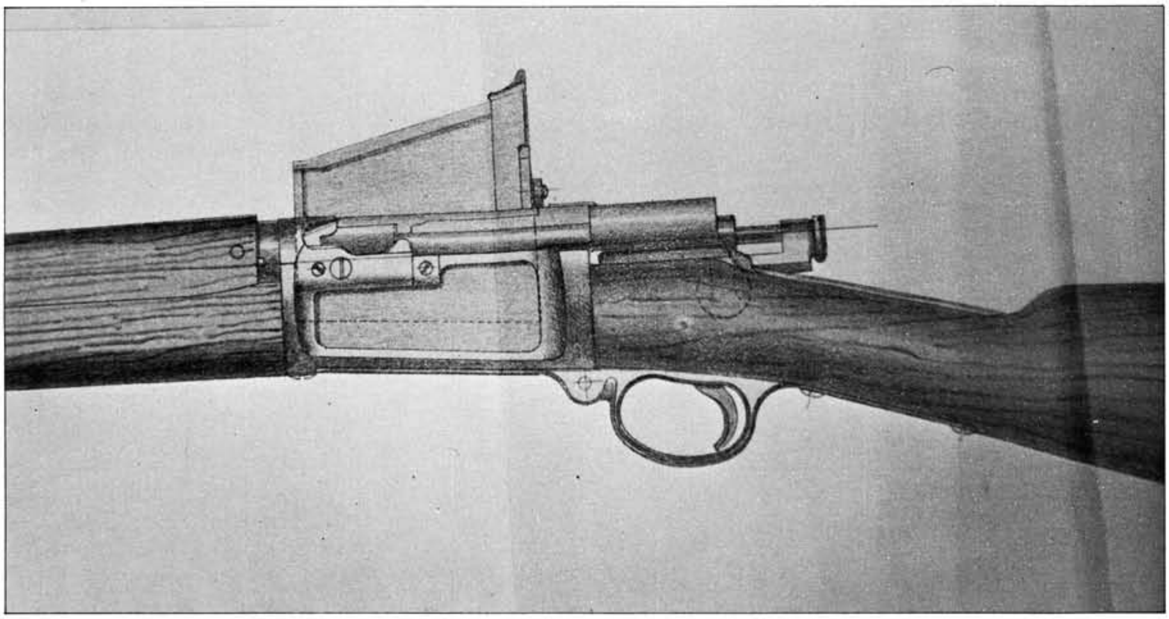

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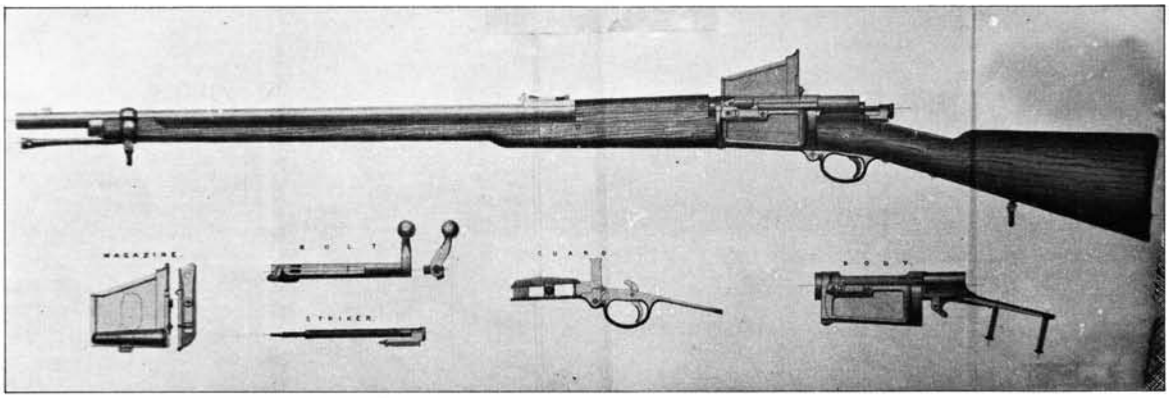

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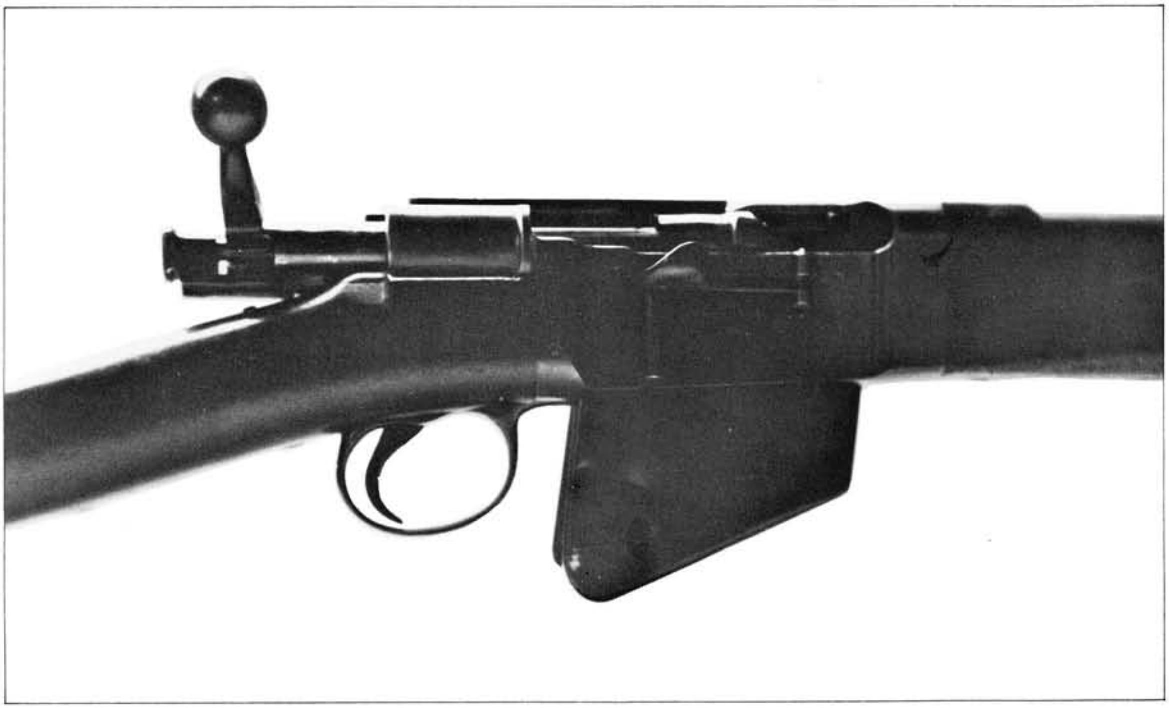


decided to recommend a rifle of ·303" calibre embodying the improved Lee action and Metford rifling, and in 1888 about 350 of this new arm were made and issued to troops throughout the British Empire for trials. The cartridges used in them were loaded with a compressed pellet of black powder. The troop trials proved satisfactory and the rifle was officially approved for manufacture on 22 December 1888 and was called the Magazine Rifle Mark I. The following description appeared in the List of Changes in War Material issued with British Army Orders dated 1 December 1889 :

Weight of rifle	9lb 8oz
Weight of bayonet	15½oz
Weight of scabbard	4¾oz
Weight of magazine (empty)	4¾oz
Weight of magazine (full)	13oz
Length of rifle	4ft 1·5in
Length of rifle with bayonet	5ft 1·45in
Length of sword bayonet	1ft 4·68in
Barrel and rifling	
Length of barrel	30·2in
Calibre	·303in
Rifling	Metford segmental
Grooves, number	seven
Grooves, depth	·004in
Width of lands	·023in
Spiral, left-handed, one turn in 10in, or 33 calibres	

The rifle embodied the Lee action, with rear locking. The cocking-piece was so arranged that the action could be set at half-cock, in which position the rifle could be carried safely. Covers were fitted to the bolt and bolt-head to protect the action from sand and mud. A safety catch was fitted to the left side of the body. With the cocking-piece in the forward position it locked the action and prevented the bolt from becoming accidently opened. The magazine held eight cartridges and was inserted in the body through an opening underneath. A cut-off was fitted to the right side of the body which, when pressed inwards stopped the supply of cartridges to the rifle chamber. One magazine was attached to each rifle by means of a chain link and a spare magazine was issued with each arm. The stock was in two pieces, the fore-end and the butt, and a wooden handguard was fixed over the breech end of the barrel to protect the hand when the barrel became hot. The rather unusual foresight was a square block, with a vertical cut through it, showing a fine line of sight. Aim was taken by fitting this square in a corresponding notch in the backsight —graduated to 1900 yards—so that lines of light of equal width could be seen on each side of it, and aligning the central line of light on the point to be

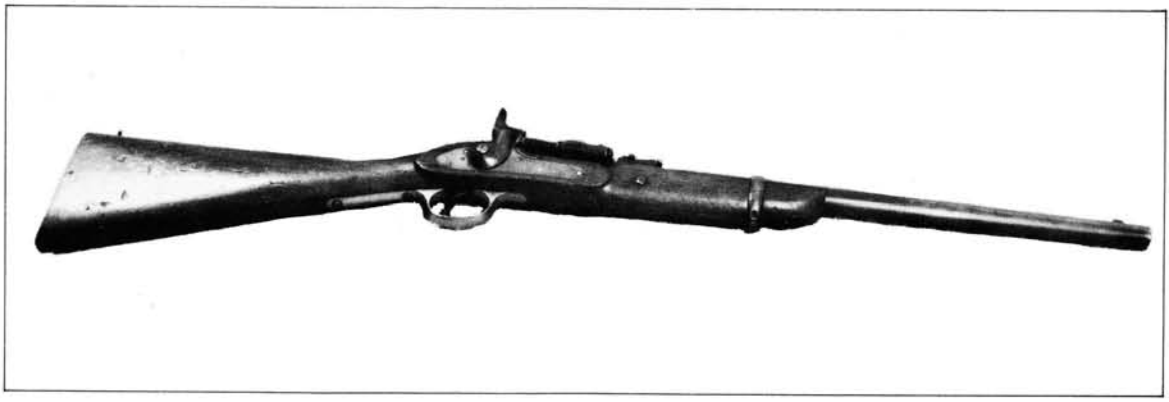
1 The Bethel Burton Magazine on the Improved Lee-Burton Rifle (*Author*)

2 The Improved Lee-Burton Magazine Rifle (*Author*)

3 An Experimental Lee action of 1886, designed for the ·45in cartridge (*Author*)

4 A Mk III Snider Cavalry Carbine, this was fitted with a steel dowel *(Editor)*

5 The Owen-Jones Magazine Rifle which did well in the Magazine Rifle Trials and came near to being adopted (*Author*)



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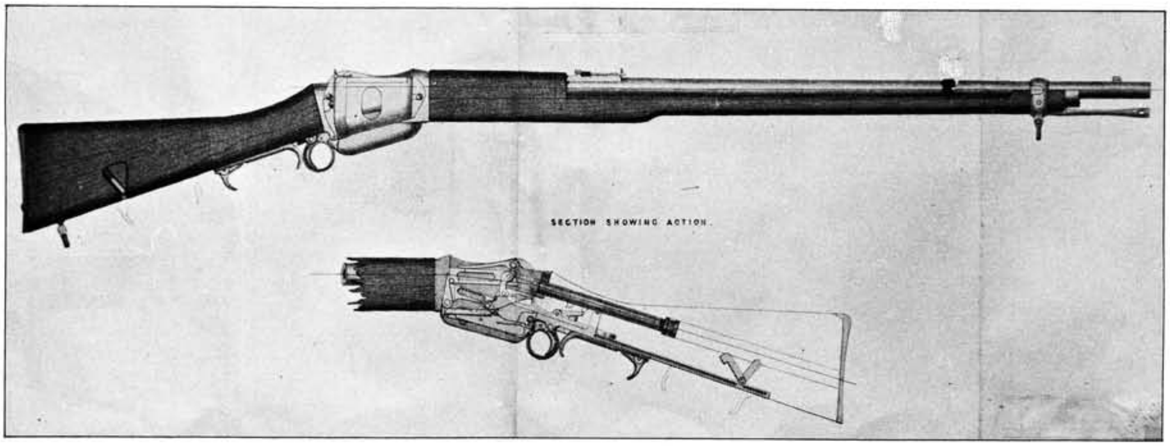

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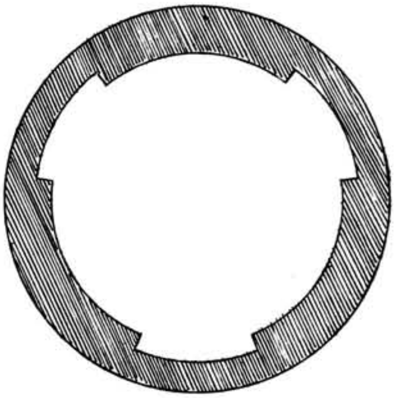
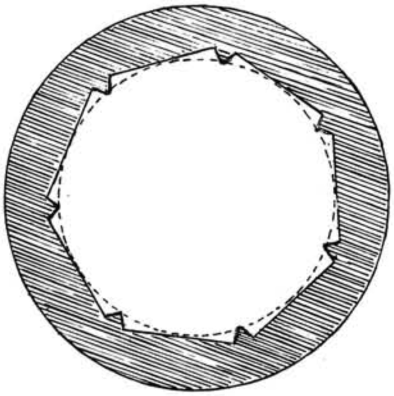
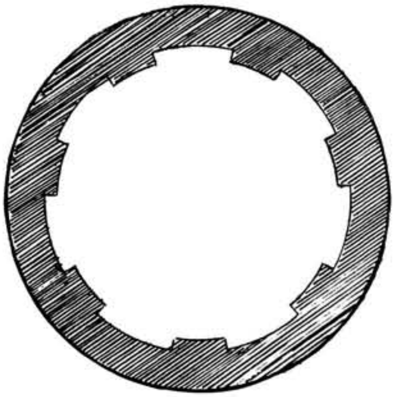


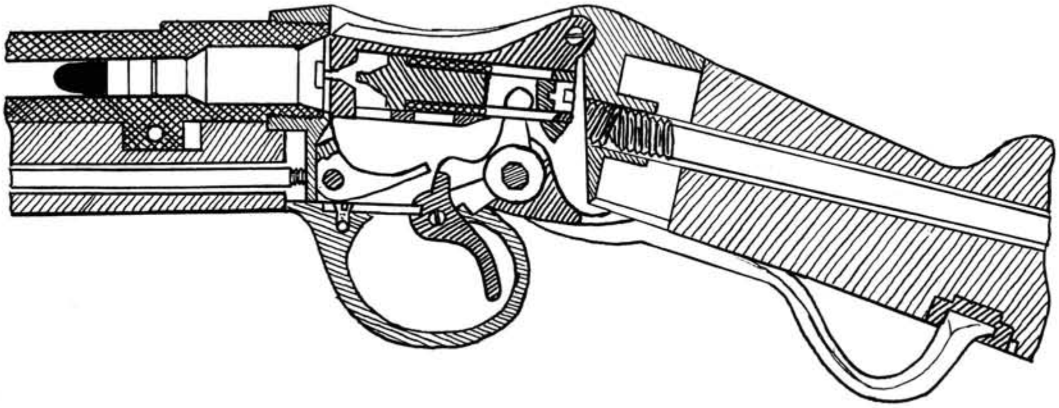
The 3-grooved rifling used in the Enfield Rifles converted to the Snider breech loading system (*Author*)



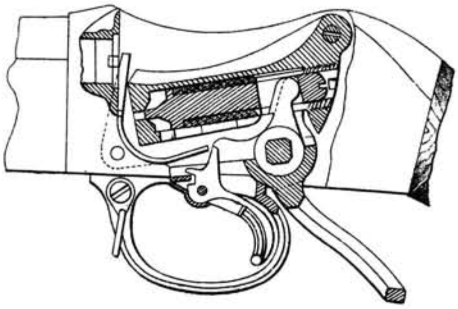
The Henry rifling had seven grooves. ·03in of the original bore was left between each groove as lands. The lands and the centres of the grooves are contained in the same circle. Right hand twist and one turn in 22in. The sharp re-entrant angles tended to accumulate fouling (*Author*)



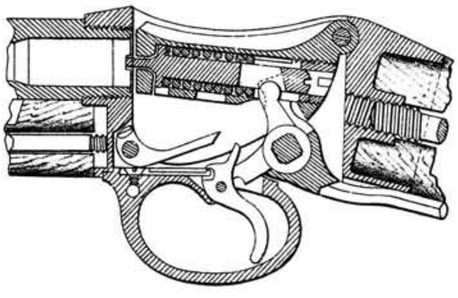
The Snider Enfields were fitted with the first steel barrels to be made at Enfield. This example is 7-grooved (*Author*)



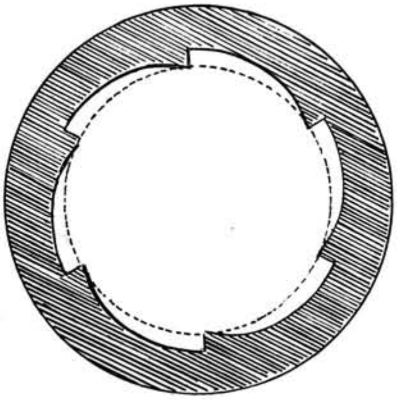
The Martini action cocked and ready to fire (*Author*)



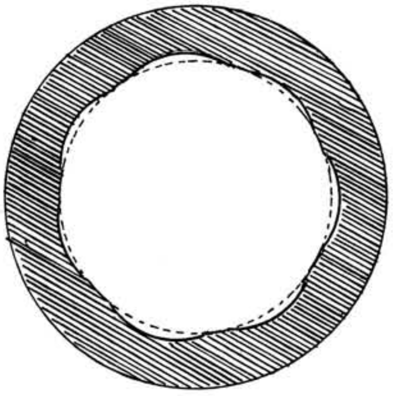
The Martini action open (*Author*)



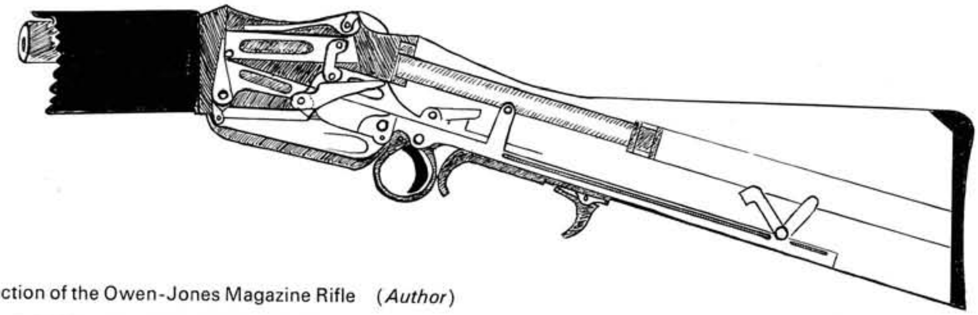
The Martini action closed and fired (*Author*)



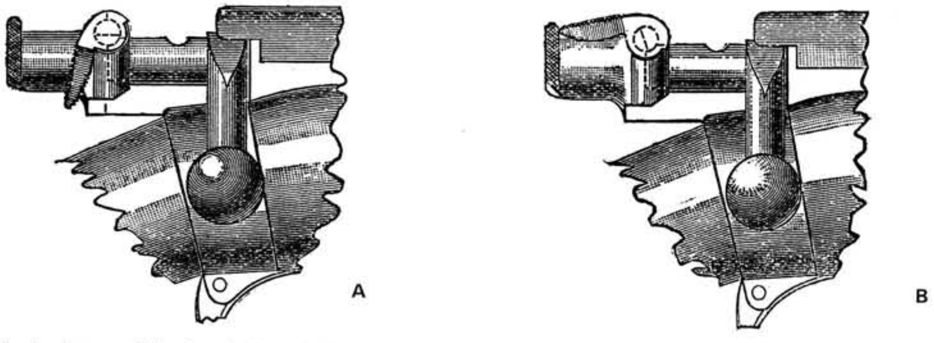
A form of ratchet rifling designed at Enfield with the object of improving the Martini-Henry. It was not a success and was never officially adopted. With right handed twist, the left (upright) edge causes the bullet to rotate to the right (*Author*)



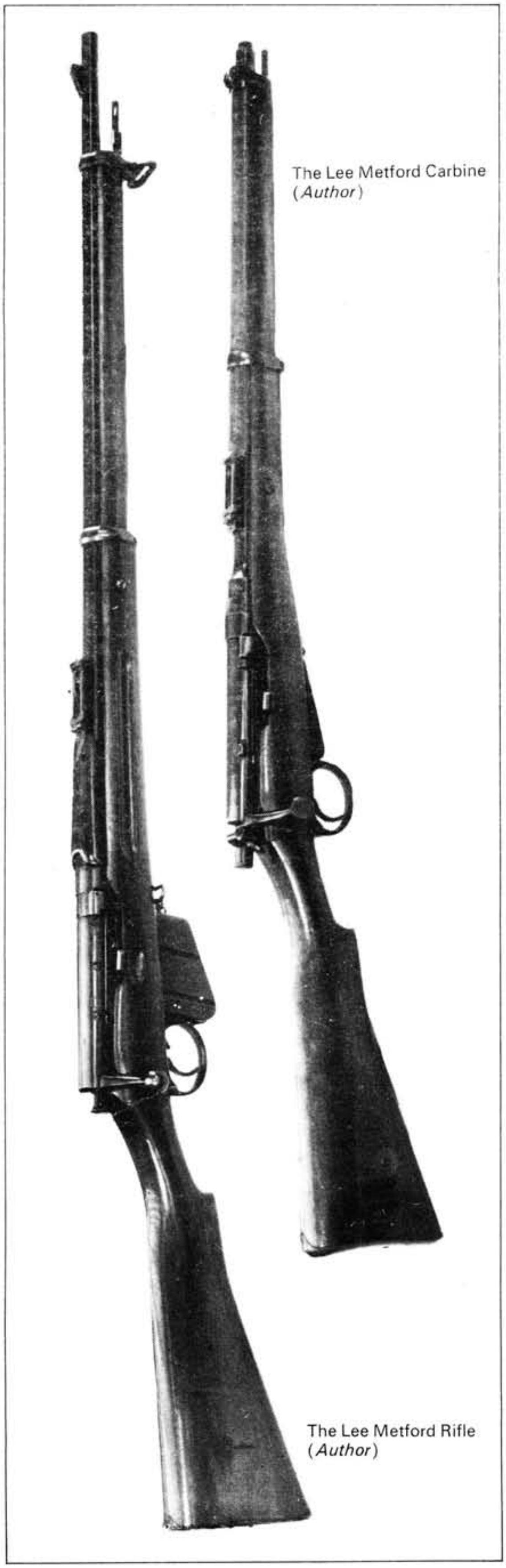
The shallow grooved rifling similar to that developed by Mr Metford. The grooves were ·004in deep, the lands ·023in wide with a left hand twist of one turn in 10in (*Author*)



The action of the Owen-Jones Magazine Rifle (*Author*)



The Lee Metford safety catch fitted to the Mk II* A) out of action B) in action (*Author*)



The Lee Metford Carbine
(*Author*)

The Lee Metford Rifle
(*Author*)

hit. This form of sighting did not prove successful and only lasted two years, when it was superseded by the 'barleycorn' (post) type of foresight.

Less than three months after the introduction of the new British Service rifle, a new cartridge giving a velocity of 1850 feet per second was approved for it. Its official name was 'Cartridge, S. A. Ball, Magazine Rifle, Mark I.' It was, however, only a temporary expedient pending the development of a successful British smokeless powder. The smoke left by a black-powder charge made concealment of the firer virtually impossible and the first British smokeless cartridge, named the 'Cartridge, S. A. Ball, ·303", Cordite (Mark I)' was introduced on 3 November 1891. The charge was about 31 grains of size $3\frac{3}{4}$ Mark I Cordite—60 strands—and the bullet, composed of 98% lead and 2% antimony, was flat-nosed and weighed about 215 grains.

On 8 August, 1891, the name of the rifle was changed to 'Lee-Metford Magazine Rifle Mark I' and nearly five months later, largely because the new cordite loaded cartridge necessitated a re-graduation of the sighting system, it was advanced to 'Mark I*'. The new sighting system embodied the more straightforward 'barleycorn' and 'notch'. With this the firer had only to concentrate on ensuring that his foresight was correctly positioned in the notch of the backsight and aligned at the point he wanted to hit. When the rifle was advanced to Mark 1* the safety catch was omitted and this did not prove popular in the Service. Consequently a new form of safety-catch was introduced which could lock the action in the cocked and un-cocked positions. It consisted of a transverse bar which could be turned by a thumb-piece attachment. The bar was cylindrical with a portion cut away so that when in the position shown in the illustration, the bolt was free to pass it. When in the position shown in the second part of the illustration the cylinder engaged in one of the two grooves cut in the bolt and locked the action. The magazine was enlarged to hold ten rounds.

As the rifle was considered to be too long for mounted troops to conveniently carry, a shortened version called the Lee-Metford Carbine was approved for manufacture on 29 September, 1894. It weighed 7lb 7oz and was 3' $3\frac{15}{16}$" in length and the magazine carried six rounds. The backsight was designed for the cordite loaded cartridge and graduated with 50 yard settings from 600 to 2000 yards.

The Lee-Metford was the parent of the long line of Lee-Enfields—to be described in a later Profile—but, due to its shallow rifling and the excessive erosion at the breech-end of the barrel caused by the cordite-loaded cartridge, it only had a comparatively short life in the British armed forces.

Small Arms Editor: A. J. R. Cormack